10/2/2000
Dr. Lunsford

MA303 Calculus I
Quiz 7

Name: Solutions
(20 Points Total)

I. Let $f(x)=\dfrac{x^3-3x+2}{x^2-1}$. Find $f'(x)$ by using the quotient rule. Do not simplify your answer. (4 points)

$$f'(x)=\frac{[D_x(x^3-3x+2)](x^2-1)-(x^3-3x+2)D_x(x^2-1)}{(x^2-1)^2}$$

$$=\boxed{\frac{(3x^2-3)(x^2-1)-(x^3-3x+2)(2x)}{(x^2-1)^2}}$$

II. Find the indicated derivatives. Clearly indicate your answers. You do not need to simplify your answers. (4 points each – 16 total)

(a) $f(x)=\sqrt[3]{x^2}\tan x$ $=x^{2/3}\tan x$

$$f'(x)=\left(\frac{d}{dx}x^{2/3}\right)\tan x+x^{2/3}D_x\tan x$$

$$=\boxed{\frac{2}{3}x^{-1/3}\tan x+x^{2/3}\sec^2 x}$$

(b) $y=(t^3-3t+1)\cos t$

$$\frac{dy}{dt}=\left[\frac{d}{dt}(t^3-3t+1)\right]\cos t+(t^3-3t+1)D_t\cos t$$

$$=\boxed{(3t^2-3)\cos t+(t^3-3t+1)(-\sin t)}$$

(c) $f(x)=\dfrac{\sin x}{x}$ $=x^{-1}\sin x$ ← use P.R.

$$\frac{d}{dx}f(x)=-1x^{-2}\sin x+x^{-1}\cos x=\boxed{\frac{-\sin x}{x^2}+\frac{\cos x}{x}}$$

or

$$=\boxed{\frac{(\cos x)x-(\sin x)1}{x^2}}$$ ← use QR.

(d) $y=x^2\sin x+2x\cos x$

$$\boxed{D_xy=\underbrace{2x\sin x+x^2\cos x}_{D_x x^2\sin x}+\underbrace{2\cos x+2x(-\sin x)}_{D_x 2x\cos x}}$$